REMARKS

Claims 1, 2, 7, and 13-14 have been amended. No new claims have been added. No claims have been cancelled. Thus, claims 1-19 are pending.

Following the Amendment after Final Rejection filed December 18, 2003, the rejections based on Matsugu (U.S. Patent No. 6,463,176) have been overcome. Thus, claims 1-16 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Fu (U.S. Patent No. 6,370,271). Claim 18 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fu. Claim 17 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fu and Hasuo (U.S. Patent No. 5,583,614). Claim 19 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Fu and Funada (U.S. Patent No. 5,257,119). These rejections are respectfully traversed.

Claim 1 recites:

> An image recognition device, for detecting arbitrary images, comprising: ... a pattern detection means to detect relative positions of said plurality of input pattern elements compared with a multiple magnification reference arrangement data of each of said target pattern elements in order to recognize whether said input image includes said target pattern.

Claim 2 recites:

> An image recognition device, for detecting arbitrary images, comprising: ... an arrangement data generating unit which stores the position data representing the arrangement of each of the target pattern elements at a plurality of magnifications; and a pattern detection unit, which based on the output of said element matching unit and said position data from said arrangement data generating unit, determines whether said target pattern can be found in said input image pattern data.

Claim 7 recites:

> An image processing device, for detecting arbitrary images, comprising: ... a pattern detection means to detect relative positions of said plurality of input pattern elements compared with a reference arrangement data, at multiple magnifications, of each of said target pattern elements in order to recognize whether said input image includes said target pattern; ....

Claim 13 recites:

> A recording medium containing computer code for implementing an image recognition method for detecting arbitrary images, ... said computer code comprising: an element matching means to match a plurality of input pattern elements obtained by ... a pattern detection means to detect relative positions of said plurality of input pattern elements compared with a multiple magnification reference arrangement data of each of said target pattern elements in order to recognize whether said input image includes said target pattern.

Claim 14 recites:

> A method of processing an image, ... comprising: inputting a reference image, said reference image being an arbitrary image; ... determining reference arrangement data for each of said target pattern elements at a plurality of magnifications; inputting data for an input image; ... and comparing said target pattern elements and said input elements.

Each of the independent claims recite a device, method, or recording medium for causing a computer to execute a method, for image processing. More specifically, each independent claim requires the associated device, method, or recording medium to be able to detect arbitrary input images and use multiple magnification reference data for each component of the image being detected.

Fu discloses an image recognition system. Significantly, the image recognition system disclosed by Fu is operative only to detect a specific type of image. More specifically, Fu states:

> The goal of the present invention is to detect patterns of the basic type shown in Fig. 3 from a bitmap image provided by any digital image acquisition device such as a scanner 12. To do this, the inventors have developed an algorithm directed at detecting such patterns which are preferably implemented in a copier system.
>
> Fu at column 6, lines 16-21.

The basic type of image is described as comprising "a relatively large circular element having a boundary defined by two concentric circles and a middle region shown in black in the figure with some specific image content inside the boundary." Column 5, lines 62-67. An example of a qualifying image is shown by Fig. 3.

Fu discloses two algorithms for performing pattern matching. The first algorithm is suitable for implementing in software and is illustrated by the flow chart of Fig. 6. The second algorithm is suitable for a hardware implementation and is illustrated by the flow charts of Fig. 10 and Fig. 6. Both algorithms are row-based algorithms and operate on a limited number rows at any given time. See column 6, lines 28-32.

Now referring to Fig. 6, the first algorithm operates by quantizing approximately 8-12 rows from the input image and storing the quantized data into one line buffer per pattern to be detected (Steps 601-602; See column 7, lines 1-27). In steps 603-607, edge filtering and curve detecting units are used to determined whether the quantized row data includes a pair of curves which might be a part of a basic image. If so, the radius of the circles formed by the curves are calculated and added to a feature list. If not, a next group of rows are analyzed using steps 601-607. If the basic image being detected can be at a variety of scales, the parameters corresponding to the circles to be detected at the variety of scales are provided for each scale. Column 7, lines 47-53. If a

portion of a circle has been detected, additional rows of data are aggregated to the existing set of rows until the full circular element can be contained within the span of rows.

At steps 608-610, the circular portion of the basic pattern has been detected and the central area is checked for the required central image by comparing the data with one or more templates. Significantly, Fu discloses using multiple templates, which can be suitable for detecting multiple images, but each template is identical in size. Column 8, lines 17-41. A matrix type process is used to account for rotation of the central image data. Now also referring to Fig. 10, it can be seen that the second algorithm operates somewhat differently from the first algorithm at the beginning, but after step 1006, which corresponds to the point where the circular portion of the basic image is detected, the second algorithm identically to steps 608-610 of the first algorithm.

In summary, Fu discloses a row-based image recognition system for detecting a specific type of image. The image includes an exterior circular portion and an interior portion. Fu discloses that the circular portion can be at a variety of scales, in which case the image recognition system will be provided with a data corresponding circles outlining the circular portion at multiple magnification. However, Fu also specifically teaches the use of a constant size template for checking the image data within the circular portion. Fu therefore fails to disclose or suggest the above quoted limitations of the independent claims, which are directed to an image recognition/processing system for detecting arbitrary images, and which require multiple magnification reference data for each component of the image being detected or processed.

The Office Action additionally cites to Hasuo and Funada. However, these references also fail to teach or disclose features corresponding to the above quote limitations of the independent claims. Accordingly, each of the depending claims, i.e., claims 3-6, 8-12, and 15-19 are also believed to be allowable over the prior art of record for at least the same reasons as the independent claims.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

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